a sheet of paper, overlying two poles of a magnet, with magnetic dust. He showed photographs of various "fields" obtained by a combination of electromagnets, and pointed out that all the cellular phenomena could be reproduced by the action of a polar or dual force such as statical electricity or magnetism, and that the apparent anomalies were due to the peculiar conditions of the protoplasm in which the field was formed. He also showed some beautiful sections of the embryos of Rhynchelmis, lent by Prof. Vejdowsky, of Prague, in which the dumb-bell-shaped figure is of exceptional size.

GEOGRAPHY AT THE BRITISH ASSOCIATION.

As the exploration of the higher mountain areas has been mainly the work of university men, it was very appropriate that Mr. Douglas Freshfield, one of the pioneers of Alpine exploration, should be president of the geographical section at Cambridge. No one was better qualified than he to deal with mountains and mankind, which formed the subject of his address, which has already appeared in NATURE (September 1).

Several other communications dealt with the "culminating area" of the globe, as Hermann Wagner calls it. Mr. Maurice de Déchy contributed a full account of the glaciers of the Caucasus, which at one time were supposed to be of very small dimensions. He gave statistics of the altitude of the snow-level in different parts of the system, showing how it rose towards the Caspian, and of the dimensions of the principal glaciers, including the depth to which their tongues descended below the snow-level. He then surveyed the variations of ice movements during the past half century, and pointed out how they corresponded with those which have been observed in the Alps. Finally, he referred to the evidences of the former great extension of the glaciers. Mr. Charles Rabot, secretary of the Paris Geographical Society and of the French Glacial Commission, discussed the importance of glacier-bursts in shaping the topography of glaciated areas. These bursts are due to the creation and subsequent sudden discharge of a reservoir of water, by a glacier dam due to the ice stopping the exit from a valley and the consequent accumulation of water, or to water gathering above, below, or in the glacier itself. The violence of the outburst is proportional to the volume of the water and the slope of the ground. In 1878 the Märjelensee discharged 7,700,000 cubic metres in nine hours, and the Gietroz outburst of 1818 attained a volume of 530,000,000 cubic feet. Twenty-five such outbursts are known to have taken place in the Alps, and they have been reported from all glaciated mountain areas. Their effects are necessarily confined to modifying the contours of the valley, by enormous erosion above, and by the deposition of vast masses of waste below. In discussing glacial phenomena, sufficient importance has probably not been given to these torrential outbursts, which must have been commoner in Pleistocene times. Mr. A. W. Andrews showed a number of excellent maps and views of passes of the Alps in order to prove that in teaching a well chosen set of lantern slides could be used to bring out their characteristic natural features, and to indicate their relation to routes, &c.

There was no tale of startling adventure recounted, but a number of excellent travel papers was read. Mr. Bruce's account of the Scottish National Antarctic Expedition, while barren in hair-breadth escapes, was one of steady scientific investigation under very difficult conditions in perhaps the most interesting area of the Antarctic. Notable though the discovery of the northern Atlantic margin of Antarctica and the depths of the ocean to the north are, the oceanographic, biological, and more particularly the meteorological work of the expedition are likely to yield results of the greatest value. It is a matter of congratulation that Mr. Mossman, probably one of the best living meteorological observers, remains in the south with the cooperation of the Argentine Government, for there the study of meteorological conditions is more important than elsewhere in high southern latitudes in view of the dangers attending the rounding of Cape Horn, and the importance of an investigation of the centres of atmospheric activity controlling its meteorology.

The papers dealing with distant lands described the low-lying Malabar coasts, the savana lands of northern Nigeria, the fertile Cyrenaica, and the puna of the Andine plateau. Mr. R. S. Lepper gave a comprehensive account of the climate, products, and peoples of the Malabar coast, illustrated by excellent views. He pointed out the great progress which had been made during the past half century, and insisted on the economic value of the region. Major J. A. Burdon, Resident of the Sokoto Province, described the Fulani Emirates of northern Nigeria in a communication which it would be difficult to over-rate. The impressive contrasts between the conditions in this laterite plateau dissected by broad flat valleys, leaving monotonous table-topped hills covered with open brush, and the dense forests of southern Nigeria were admirably shown, and the resulting effects traced—Paganism and degenerate peoples in the forest belt, Islam and a well developed social organisation in the north. The effects of the nomad Fulani conquest of the region were traced, and form an interesting contribution of the evidence which goes to prove that a definite type of social organisation is connected with nomadic pastoral peoples all the world over, and that a fairly constant series of events follows the thorough conquest of a settled people by such nomadic tribes. The present British administration is fortunately inspired by the scientific spirit of constructive action based on existing institutions.

In 1903 Mr. Arthur Hill made a journey to Lake Titicaca. The uniformity of the vegetation at altitudes from 12,500 to 16,500 feet was striking; the plants growing in rosettes have long tap-roots by which they reach the warmer soil at some distance below the surface, and their leaves are linear and hairy, and suited to the dry air subjected to temperature variations of as much as 70° F. within a few hours.

Mr. D. G. Hogarth spent nearly a week in Cyrenaica in April, 1904, and was able to note certain geographical facts which explain some of the peculiarities of Cyrenaic history. He pointed out that changes of coastal level must have taken place since ancient times. This point is of considerable importance, as Mr. R. S. Günther showed by a series of maps and photographs of the Neapolitan region. In a paper descriptive of these he summarised the results of his investigations on the Bay of Naples,[1] where he found a mediæval land level 12 to 23 feet below the present one, and a Græco-Roman land level some 16 feet above the existing level, and therefore in places 40 feet above the mediæval one. Round Genoa the coasts were also lower in the thirteenth and fourteenth centuries, and the Nile delta has been shown to be higher in classical times. The old shore lines are not horizontal, and Mr. Günther considers that land oscillations have been the cause of the changes of level. In the discussion which followed Messrs. R. D. Oldham and J. Y. Buchanan both pointed out other changes which had been observed in the level of the Mediterranean. A special committee to investigate the evidence was appointed by the general committee. The two afternoon lectures arranged by this section had reference to the Mediterranean basin; and Dr. Tempest Anderson's views and description of the Lipari Islands reminded his hearers of the obvious unstable condition of part of it at the present day. Mr. Silva White's admirable account of the Nile Valley emphasised its organic unity, its physical and political insularity, which has resulted in the political control of Egypt since the time of Alexander the Great by the Power possessing command of the sea. He also showed some views, and gave an eloquent description of the desert barrier which surrounds it.

Coming to our own country, the papers dealt with problems within the sphere of influence of Cambridge. Mr. H. Yule Oldham, reader in geography at Cambridge, discussed the changes in the fen district since the seventeenth century, when the tides came up the Ouse and nearly reached Cambridge. By the cutting of the new Bedford River and the building of the sluice at Denver, the tidal waters were diverted up the new river, and this permitted the drainage of the fens. The old course of the Ouse was indicated in modern maps by the irregular boundary between Cambridgeshire and Norfolk, which followed it. Mr. R. H. Yapp dealt with the vegetation of the fen region, and by a series of excellent slides showed the characteristic forms found in different edaphic conditions. The Rev. Alfred Hunt claimed the hamlet of

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[1] The full report is published in the *Geographical Journal* for August and September, 1903; and in *Archaeologia*, lviii.

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Burnham, in the parish of Thornton Curtis, in north Lincolnshire, four miles from the Humber, where entrenchments have been found, as the site of the battle of Brunanburh, when, under Athelstane, the south of England obtained the dominance over the north.

Dr. Mill exhibited and described a map showing the names of the physical features of England and Wales to which the Royal Geographical Society's council had given its imprimatur. Mr. Whitaker protested against the use made of the term weald, the new name given to Ashdown Forest, and other points. It is to be hoped that after a thorough discussion by all interested a general agreement will be come to as to the use of topographical terms. The majority of those on the map will be accepted by all.

Three papers dealt with map-making. The Rev. H. S. Cronin described what he believed to be the way in which Ptolemy constructed his map of Asia Minor, and pointed out how wrong conclusions were certain to arise from treating it as if it were a modern map, or his geography as modern geography. Mr. C. R. Beazley contributed an account of the Portolani of the early fourteenth century, the first true maps of the Mediterranean. Major C. F. Close discussed the methods of topographical surveying suitable for different countries, choosing the United Kingdom, India, the Gold Coast, where "long traverses" are necessary owing to the dense forest making the cost of triangulation prohibitive, South Africa, already triangulated and ready for plane tabling, which can be carried out in the open country under very favourable conditions, and Canada, for which a scheme has recently been drawn up by Major Hills. In Canada, in very special circumstances, photographic surveying has been carried out, but Major Close considered that ordinary methods under ordinary conditions were better as regards accuracy, rapidity, and cost. This was queried in the subsequent discussion. Sir David Gill dealt with the condition of the South African survey, which owes so much to him.

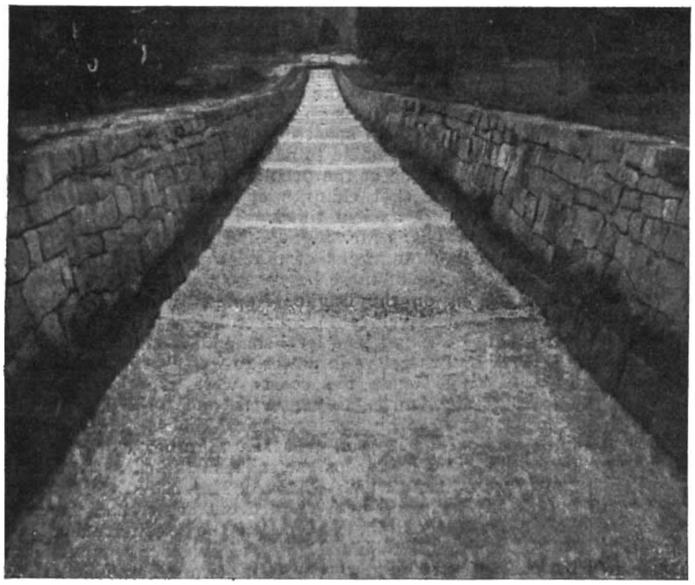

FIG. 1.—A Roll Wave leaping the Outfall of the Grünnbach Conduit.

The report by Dr. Cornish of the committee on terrestrial surface waves and wave-like surfaces was read. It contained a description of roll waves, a term used to describe waves resembling a bore travelling down stream more rapidly than the current in such open paved conduits as the lower courses of the Guntenbach and Grünnbach, which flow into the Lake of Thun (see Fig. 1). The phenomenon has been noticed on the Tees. The committee was re-appointed.

The geographical section combined with the zoological one to recommend the appointment of a committee to carry on physical and biological investigations in the western Indian Ocean under the leadership of Mr. Stanley Gardiner. This was duly appointed, and a grant of 150*l*. assigned to it.

Another important committee was nominated on the joint recommendation of geologists and geographers to collect information and report on the meaning and distribution of local terms given to topographical and geological features.

CONFERENCE OF DELEGATES OF LOCAL SCIENTIFIC SOCIETIES.

TWENTY years have passed since the local scientific societies of this country first had the opportunity of coming into official relation with the British Association. Although it is believed that this relationship has been, in various ways, of much benefit to many of the societies, it must be admitted that the results, viewed as a whole, have hardly equalled the expectations which were originally entertained when the scheme of affiliation was projected. This view was prominently brought forward at the conference of delegates from the corresponding societies recently held at Cambridge.

The chairman of the conference, Principal E. H. Griffiths, F.R.S., of Cardiff, pointed out the desirability of binding together all the scientific societies of this kingdom, so that they could move, in matters of national importance, as one body. He pictured them, at present, as a scattered heap of iron filings, waiting for the British Association to act as a magnet in their midst, so as to "transform the confused assemblage into a field of symmetry and beauty."

The work of the local societies may be said, broadly speaking, to be of two kinds, *educational* and *technical*, the latter including observational and investigational work. Of these branches, the chairman was disposed, in the present state of things, to regard the former as the more important. "The work is educational not only in arousing intelligent interest in the facts of natural science and quickening in the individual the power of observation, but also in promoting the missionary spirit which will enable the members to excite the interest and sympathy of their neighbours."

In order to extend the influence of the British Association, Principal Griffiths suggested some relaxation in the rules which now regulate the admission of societies. At present no society can be brought into union unless it publishes the results of original investigations. But, said he, "it is very doubtful if publication *is* the best test of merit"; and he added that if we exclude those societies which "refrain from adding to the mass of literature under which there is danger of our being smothered, it is possible that we are excluding the very bodies whose sympathy and interest we should most wish to encourage."

Principal Griffiths was accordingly led to advocate the recognition of two classes of corresponding societies, one to be called affiliated societies, conforming to the existing regulations, the other to be called associated societies, including any local society which has existed for a period of, say, three years, and numbers not fewer than fifty members. "Surely," said the chairman, "we desire to throw our doors as wide open as possible, surely we wish to give every encouragement to all scientific societies, but more especially to those working under difficulties, to strengthen the hands of their promoters, and to ask their aid and assistance in our deliberations. Moreover, it is precisely those societies with narrow means, and whose members are possibly drawn from working classes, that can be of the greatest use to us. They are missionaries situated where we most want them, and preaching to the unconverted. This yearly meeting of single delegates from a few of the leading societies, although an admirable nucleus, is not sufficient to produce crystallisation of the scientific interests in solution in the population of this kingdom."

As a means of inter-communication between the societies, and with the view of uniting them "in common action for

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